
Fibre Remote IPE maintenance

This section describes Meridian 1 maintenance tools and procedures for identifying Fibre Remote IPE faults, locating defective equipment, correcting problems by fixing or replacing defective equipment, and verifying the operation of Fibre Remote IPE after corrections or replacements have been made.

System overview

Fibre Remote IPE maintenance deals with two types of problems:

- Installation
- Operation

Installation problems are created during the installation of an entire Meridian 1 with the Fibre Remote IPE or during the addition of the Fibre Remote IPE to an existing system.

Operation problems occur when components fail or equipment is accidentally disconnected during normal system operation.

In either case, identifying the problem should be approached systematically. A problem may have more than one cause. To isolate the cause, a knowledge of Meridian 1 Fibre Remote IPE operation is required. This information can be found in “Fibre Remote IPE product description” on page 3. Once the cause is identified, the problem can be corrected by replacing the defective card, connecting accidentally disconnected cables, or correcting the software problem.

Meridian 1 provides built-in self-diagnostic indicators and software and hardware tools. These diagnostic facilities simplify system troubleshooting and reduce mean-time-to-repair (MTTR).

This document focuses on the maintenance of Fibre Remote IPE equipment at the remote site and in the Meridian 1 system. It requires that Meridian 1 non-Fibre Remote IPE functions operate correctly before you start diagnosing Fibre Remote IPE problems. System installation and maintenance guide sections of *Meridian 1 general maintenance information* (553-3001-500), *Meridian 1 fault clearing* (553-3001-510), and *Meridian 1 hardware replacement* (553-3001-520) describe how to maintain the entire Meridian 1 system. This chapter describes how to maintain the Fibre Remote IPE equipment as an integral part of Meridian 1.

Diagnostic tools

Diagnostic tools are used to troubleshoot problems in Meridian 1 including problems with the Fibre Remote IPE. When diagnosing Fibre Remote IPE problems, you may have to use more than one of these tools.

Hardware diagnostic tools

Meridian 1 hardware diagnostic tools consist of:

- card self-tests
- LED indicators
- display codes
- enable/disable switches

Self-test

A self-test is automatically performed by each Fibre Remote IPE card when you insert it in an operating system module, when you enable the card, or when you power up or reset the system. You can also perform a self-test on a card using software commands.

This test checks general card functions and determines if they are operating correctly. It is very useful when you first install the cards; on insertion, the card automatically starts self-test and it gives you an immediate indication of its operating status.

LED indicators

Meridian 1 cards are equipped with red LED indicators, and module power supplies are equipped with green LED indicators. These indicators show the status of each card or power supply.

Figure 19 shows the NT1P61 Fibre Superloop Network card. It also shows the LED that indicates the status of the Fibre Superloop Network card and one LED on each Electro-optical packlet that indicates the status of the link.

Display codes

Some Meridian 1 cards, such as the NT1P62 Fibre Peripheral Controller card, are equipped with an alphanumeric display on the faceplate. Figure 20 shows two seven-segment displays on the faceplate of the Fibre Peripheral Controller card. They are used to automatically display the card status and identify possible faults with the card. These codes are displayed in hexadecimal notation and are listed and interpreted in Appendix A of this manual and in section (HEX) in *X11 input/output guide* (553-3001-400).

Codes displayed on the common equipment cards are logged into a history file and can be printed and reviewed to analyze the sequence of events leading to the presently displayed status. The last 16 codes displayed by the Fibre Peripheral Controller card are stored in memory and can be reviewed and then cleared by using Network and Signaling Diagnostic Program LD 30.

Figure 20 shows the NT1P62 Fibre Peripheral Controller card with two hexadecimal displays that display the status of the card. It shows the card LED that also indicates the state of the Fibre Peripheral Controller card and one LED on each Electro-optical packlet that shows the status of the link.

Enable/disable switch

Some Meridian 1 cards, such as the Fibre Superloop Network card shown in Figure 19, are equipped with an ENL/DIS switch. This ENL/DIS switch is located on the card's faceplate. It is used to disable the card before you remove it from an operating Meridian 1 system without disrupting other system functions. After you repair or replace the card, you can place it back in service by setting the switch to the enable position.

Figure 19
Fibre Superloop Network card

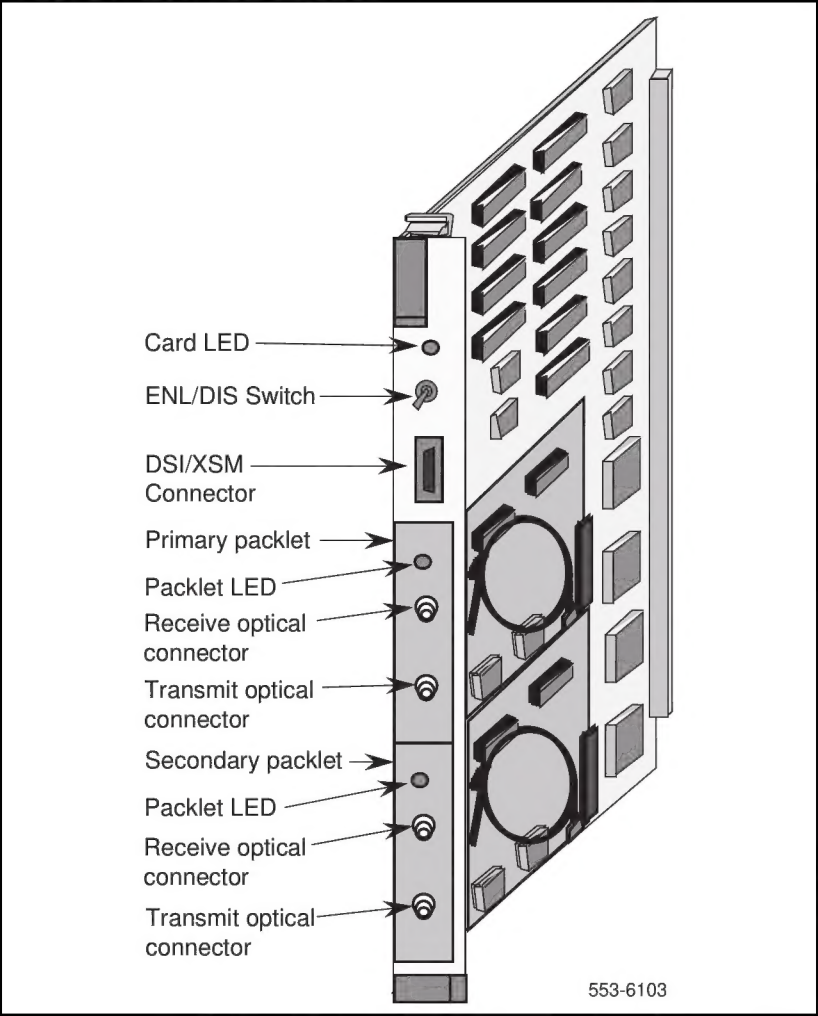
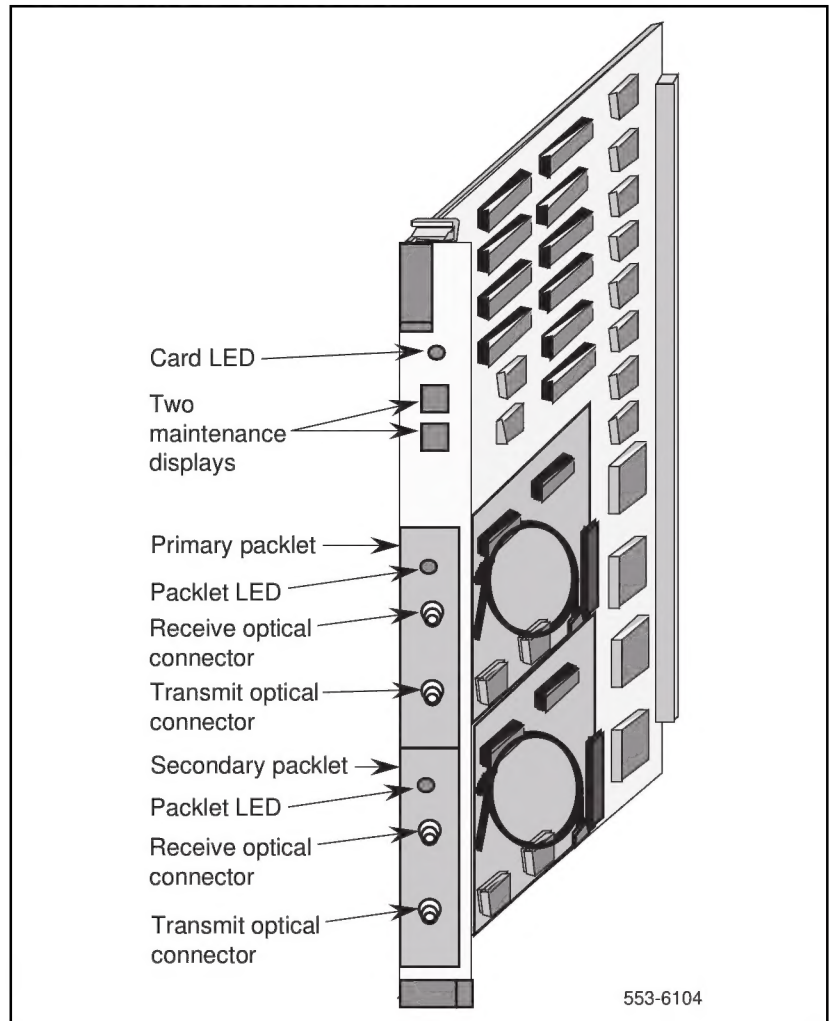


Figure 20
Fibre Peripheral Controller card



System monitors and alarms

Meridian 1 system monitoring units continuously monitor the environmental and power status of the system and the individual system modules including the Fibre Remote IPE equipment.

The system monitor issues alarms when:

- CPU fails or system reloads
- main power source is lost
- power supply in the modules fails
- system temperature exceeds limits because of blower or fan failure

Meridian 1 alarms are based on the type and severity of faults reported by the system monitors and indicators. These alarms are divided into:

- major alarms, which indicate serious problems that require your immediate attention
- minor alarms, which indicate isolated faults relative to a limited number of call connection problems that do not require your immediate attention

Fibre Remote IPE issues a red alarm when a major alarm occurs at the local Meridian 1 site and a yellow alarm when a major alarm occurs at the Fibre Remote IPE site.

Software diagnostic tools

Meridian 1 software diagnostic tools are used to monitor the system status, provide the ability to test various system functions and equipment suspected of being faulty, and log and display system fault history. These are:

- resident diagnostic programs
- interactive nonresident diagnostic programs
- History File
- user reports

Resident programs

Meridian 1 resident programs are diagnostic and administration programs that continuously monitor system operation and report faults and generate system messages, which are displayed on the system terminal or printed on a system printer. These system messages are listed in *X11 input/output guide* (553-3001-400).

These messages are:

- maintenance display codes listed under HEX that indicate status and error conditions in the system
- maintenance messages listed under XMI in Appendix A and reported to the terminal over the MMI port that indicate status and faults with Fibre Remote IPE equipment
- error messages listed under ERR that indicate hardware faults and under BUG that indicate software faults
- overload messages that indicate faulty peripheral cards listed under OVD
- error messages listed under PWR that indicate power faults
- fault history file that can be printed and reviewed to identify fault events leading to the present status

Resident administration programs provide automatic system administration routines that facilitate system initialization and fault recovery.

These are:

- overlay loader program that finds, loads, and executes all nonresident programs selected to run as midnight and background routines
- system loader program that downloads the call processing programs and starts checking main memory when executing sysload
- system initialization program that automatically starts after the system loader program completes the downloading process and outputs the initialization messages listed under INI in *X11 input/output guide* (553-3001-400)

Nonresident programs

Nonresident programs can be interactive or automatically executed programs. These programs are stored on the system hard disk or floppy disks and are downloaded by the overlay loader program to system memory on demand or at a predetermined time of day such as for midnight and background routines testing.

You can access interactive programs through a maintenance terminal or a maintenance telephone, as described in this chapter. These programs are used to:

- test the equipment and place lines and trunks out of service when testing or faulty and back into service when testing is completed or the line or trunk has been repaired or replaced
- verify the status of a fault
- verify that a fault has been corrected and the equipment is operating correctly

You can select a number of nonresident diagnostic programs by using Configuration Record Program LD 17. This is a program that selects other diagnostic programs and executes them automatically as midnight and background routines. These programs test the entire system and print a report that lists the test results.

You can also manually select continuity tests that check continuity between the Fibre Superloop Network card and the Fibre Peripheral Controller card, as well as other network and peripheral controller cards. You can specify these tests in Background Signaling and Switching Diagnostics LD 45.

Superloop and Controller cards maintenance commands

The maintenance commands of the NT1P61 Fibre Superloop Network card and NT1P62 Fibre Peripheral Controller card are identical to those of the standard NT8D04 Superloop Network and NT8D01 Peripheral Controller cards. These commands are used to manipulate the operational status and perform diagnostic tests on these cards. These commands are located in Network and PE Diagnostic LD 32, which can be accessed using the administration terminal or the maintenance telephone.

Table 8 lists superloop maintenance commands provided by Network and PE Diagnostic LD 32.

Table 8
Meridian 1 network superloop maintenance commands

Maintenance command	Maintenance command description
DISL loop	Disables network loop
ENLL loop	Enables network loop
DISS I s	Disables a shelf or module
ENLS I s	Enables a shelf or module
DSXP x	Disables Peripheral Controller and all IPE cards
ENXP x	Enables Peripheral Controller and all IPE cards
ENXP XPEC x	Enables Peripheral Controller but not IPE cards
STAT loop	Displays status for one or all network loops
SUPL loop	Prints data for one or all superloops
XNTT loop	Self-test on a Network card for a specific loop
XPCT x	Self-test on Peripheral Controller x
XPEC x	Prints data for Peripheral Controller x

Fibre Remote IPE MMI maintenance commands

Fibre Superloop Network card and Fibre Peripheral Controller card provide a man-machine interface (MMI) port to connect a configuration and maintenance terminal. Through this terminal, you can directly issue commands to these cards to test and maintain Meridian 1 fibre-optic equipment including the fibre-optic link.

Table 9 list these commands. However, for a detailed description of these commands, refer to Appendix A in this document, where they are listed in alphabetical order.

Table 9 lists MMI commands directly issued to the system over the MMI terminal. They can be connected to the Fibre Superloop Network card and the Fibre Peripheral Controller card MMI port.

Table 9
MMI maintenance commands (Part 1 of 2)

Maintenance command	Maintenance command description
HELP	Displays the list of MMI commands
<esc>L	Changes the MMI terminal to Local mode
<esc>R	Changes the MMI terminal to Remote mode
SUBM R	Places the Fibre Superloop Network card in Remote mode
SU R	Sets Fibre Superloop Network card in Remote mode when the MMI port is connected to an SDI port
SDEF L/R	Sets the default mode to Local or Remote
QDEF	Checks the default mode of the MMI port
STAD dd mm yy hh mm ss	Sets time and data
TTAD	Checks time and date
SUBM string	Sends a command to the other side of the link, where string = actual command
PLOG{n}	Prints n messages from a log file

Table 9
MMI maintenance commands (Part 2 of 2)

Maintenance command	Maintenance command description
NLOG {n}	Prints the next n messages from a log file
CLOG	Clears the log file
STAT	Checks the card status
IDC M/P/S	Checks the card ID for the main board, the primary packet, or the secondary packet
SXSM n	Sets system monitor port number for the wall-mounted Fibre Remote IPE
QXSM	Checks the system monitor port number
TEST P/S	Tests the main card if a parameter is not specified (card must be disabled). Test idle primary packet if P is specified, or test idle secondary packet if S is specified. When testing a packet, the packet must be idle but the card can be enabled and active.
SVER version	Sets PSDL version that matches the card version. It should also match the loadware version of the standard Superloop Network or Peripheral Controller card.
QVER	Checks the firmware and loadware version
QFIB	Checks the status of fibre-optic links
MANS PRI/SEC	Manual switch to primary or secondary link
FORC PRI/SEC	Forced switch to primary or secondary link
MCLR	Clears manual switch, resumes automatic backup

History File

Meridian 1 can be equipped with the History File feature, which allows the system to store events such as:

- service changes
- maintenance messages
- software errors
- initialization and system download messages
- traffic messages

These messages can be printed and analyzed to identify the events that led to the status. You can select the type of messages you wish to store. For information on how to select messages to be logged into the History File, refer to *X11 features and services* (553-3001-305).

User reports

User reported faults may give you a clue of what failed in the system. These are:

- major alarms reported by attendant
- calls with no ringing or no dial tone
- trouble with calls in specific Fibre Remote IPE modules
- trouble with specific terminals
- calls that cannot be transferred, and so on

Using maintenance programs

To use Meridian 1 maintenance programs, you must access Meridian 1 using a maintenance terminal or maintenance telephone.

Logging in on the maintenance terminal

To access the program, you must enter a valid password. To do this, type **LOGI** and press the Enter key. The following appears:

```
PASS?
```

Type your password and press the Enter key. Blanks will appear on the screen as you type your password. If you see:

```
OVL015  
>
```

you entered an invalid password. Type your password again and press the Enter key. If you entered a valid password, you will see:

```
>
```

This means you are logged in. You are now communicating with Meridian 1 and can access the program.

Accessing the program

To access any program on Meridian 1, type LD followed by a space and the program number after the > prompt and press the Enter key.

For example, to access Network and PE Diagnostic Program LD 32, type **LD 32** after the > prompt and press the Enter key. At the prompt, type the command you wish to execute.

If for example, you wish to enable network loop 3 that is supported by a Fibre Superloop Network card, at the prompt type:

.ENLL 3

This will attempt to enable the Fibre Superloop Network card supporting network loop 3.

Responding to error messages

If you enter incorrect information after a prompt, the program displays a warning message or an error message. The prompt is displayed again below the error message so you can enter the correct information.

Exiting the program

To exit the program, type **** and press the Enter key. You see

>

This means that you have successfully exited the program. Now, you can either access another program or log out.

Logging out

After you exit the program, you should log out. To do this, type **LOGO** at the > prompt and press the Enter key.

Logging in and using a maintenance telephone

You can use a telephone as a maintenance terminal if you define its class-of-service as MTA (maintenance set allowed) in Telephone Set Program LD 11. This feature allows you to access diagnostic programs in Meridian 1 and execute a limited set of maintenance commands to test system functions.

To enter commands on a maintenance telephone you have to use its key pad. The numbers on the key pad represent numbers and letters that you normally use on a video display terminal keyboard.

Table 10 shows the translation from a terminal keyboard to a telephone key pad.

Table 10
Keyboard to key pad translation table

Terminal keyboard				Telephone key pad
			1	1
A	B	C	2	2
D	E	F	3	3
G	H	I	4	4
J	K	L	5	5
M	N	O	6	6
P	R	S	7	7
T	U	V	8	8
W	X	Y	9	9
			0	0
			Space or #	#
			Return	##

To use a diagnostic program on Meridian 1:

- 1 Press the prime DN key.
- 2 Place the telephone in maintenance mode by entering **xxxx91** on the key pad, where **xxxx** is the customer's Special Prefix number (SPRE) as defined in LD 15. Normally xxxx is 1, thus, you would enter **191**.
- 3 Enter ****** to check if the communication link is idle.
- 4 If you detect a busy tone, Meridian 1 is in session with another maintenance or administration terminal. Enter ******** to force the other terminal to log out. If you do not detect a busy tone, Meridian 1 is idle and you can automatically access Meridian 1.
- 5 Enter **53#xx##** to load a diagnostic program, where **xx** is the program number. For example, to load Network and PE Diagnostic Program LD 32, you would enter **53#32##**.
- 6 Perform the maintenance tasks by executing the maintenance commands resident in the program you loaded. For example, from Network and PE Diagnostic Program LD 32 you can disable a fibre network loop by executing (**DISL loop**), where loop is the Fibre Superloop Network card loop, say 3. To execute this command, enter on the key pad **3475#3##**.
- 7 Press the Release key to log out.

Isolating and correcting faults

Now that you are familiar with the troubleshooting tools, you can begin troubleshooting Fibre Remote IPE equipment. Based on whether Fibre Remote IPE equipment has just been installed and is not yet operational or it had been operating correctly and is now faulty, you can determine what may be the most probable cause of failure.

Types of faults

Problems can occur in the following areas:

- Hardware
- Configuration
- Software

The types of faults you must isolate and correct depend on when the faults occur during installation or in a previously operating system. For example, in a newly installed system, the fault may be in any or all of the three areas; however, in a previously operating system, the fault will probably be in the hardware.

Fault isolation steps

The following steps show you how to isolate system and Fibre Remote IPE faults using the diagnostic tools described in this chapter:

- 1** Observe and list the problem symptoms the system is exhibiting. Typical symptoms can include the: Fibre Superloop Network card or Fibre Peripheral Controller cards lighting their red LEDs on, the Fibre Peripheral Controller card faceplate display showing a fault code, or the Electro-optical interface LEDs indicating no transmission on the fibre-optic link. Others include common equipment or power supplies having their green LEDs turned off, maintenance codes being displayed on some of the common equipment, network cards displaying codes that indicate faults, and so on.
- 2** Note whether Fibre Remote IPE was just installed and has not been operating, or if it has been operating correctly and is now faulty. Based on this, refer to “Newly installed Fibre Remote IPE” on page 108 or “Previously operating Fibre Remote IPE” on page 108 for lists of the most common problems.

- 3 Take the action recommended by the fault isolation and correction tables, which will guide you through fault isolation steps and recommend what test procedures to use.
- 4 If after following the diagnostic procedures Fibre Remote IPE still does not operate correctly, contact your field service representative.

Newly installed Fibre Remote IPE

Problems that occur during the installation of an entire system, including the Fibre Remote IPE, are usually caused by:

- improperly installed cards
- loose or improperly connected external communication cables, fibre-optic patchcords, or fibre-optic link cables
- incorrect software version
- incorrect Fibre Remote IPE configuration

These types of problems may also occur when:

- installing additional Fibre Remote IPE equipment into an already operating system
- installing a new software version or changing Fibre Remote IPE configuration

Check the symptoms listed in Table 12 that are related to problems with a newly installed Fibre Remote IPE.

Previously operating Fibre Remote IPE

Problems that occur during the normal operation of Fibre Remote IPE are usually caused by:

- faulty equipment
- accidental disconnection of cables
- improper environmental conditions

Check the symptoms listed in Table 12 that are related to problems with a previously operating Fibre Remote IPE.

Meridian 1 fault isolation and correction

To isolate Fibre Remote IPE faults in the Meridian 1 system, you must first isolate and correct the common, the network, and the power equipment faults to make Meridian 1 non-Fibre Remote IPE functions operational. You can then proceed with fault isolation and fault correction of Fibre Remote IPE functions.

To aid you in isolating the problems in a systematic way, use the fault isolation and correction tables. These tables guide you through logical steps to determine the cause of the problem based on the visual fault indicators and system fault messages you see.

Table 11 lists Meridian 1 problem symptoms, a diagnosis of the problem based on the observed symptoms, and the recommended solution to the problem.

Table 11
Meridian 1 common and network equipment problems (Part 1 of 2)

Symptoms	Diagnosis	Solution
Green LEDs on the power equipment are off.	Power source lost, power defective, or disconnected power cables.	Check the power source, circuit breakers, and power cables. Refer to <i>Meridian 1 fault clearing</i> (553-3001-510) to correct the problem.
Maintenance terminal displays PWRxxxx messages.	Power supply, Power Distribution Unit, or Blower/Fan unit defective.	Refer to <i>X11 input/output guide</i> (553-3001-400) for a list of PWR messages. Also refer to Appendix A for wall mounted cabinet PWRxxxx HW SM UEM U message format. Based on the message, take the appropriate action to resolve the problem.
Some red LEDs on the common, network, and/or peripheral equipment are on and call processing has stopped.	Common or network equipment cards faulty. Peripheral equipment cards faulty.	Observe the error messages on the terminal and check for ERR and/or BUG messages listed in <i>X11 input/output guide</i> (553-3001-400). Use this information to locate and correct the fault. Refer to <i>Meridian 1 fault clearing</i> (553-3001-510).

Table 11
Meridian 1 common and network equipment problems (Part 2 of 2)

Symptoms	Diagnosis	Solution
Maintenance terminal displays OVDxxxx messages.	Superloop Network Card, Network Card, and/or Peripheral Signaling Card are disabled.	Observe the OVD messages on the terminal and check the description of these messages listed in <i>X11 input/output guide</i> (553-3001-400). Use this information to locate and correct the fault. Refer to <i>Meridian 1 fault clearing</i> (553-3001-510).
Maintenance display codes on the CPU cards and storage devices show fault codes.	Common equipment disk drives hardware faults, memory faults, or interrupt faults.	Refer to <i>X11 input/output guide</i> (553-3001-400) for a list of all the HEX codes. Based on the maintenance display codes description, take the appropriate action and resolve the problem.
Maintenance display codes on network cards show faults.	Indicates bus error or card problem.	Reinsert the card and observe the self-test codes. Refer to <i>X11 input/output guide</i> (553-3001-400) for a list of all self-test codes and their description. If the problem remains, replace the card.
Major or minor alarms.	Common, network, and/or peripheral equipment failure.	Refer to <i>Meridian 1 fault clearing</i> (553-3001-510) to identify the cause of alarm. Check the history file.

After you isolate and correct common equipment and network equipment faults, all the other system and card faults may clear and the system may start operating normally. If this does not occur, you must proceed with troubleshooting Fibre Remote IPE equipment as described in “Fibre Remote IPE fault isolation and correction” on page 111.

If you cannot resolve the problem after exhausting all the available diagnostic tools and test procedures, make a list of all the symptoms you observed and contact your field service representative.

Fibre Remote IPE fault isolation and correction

After Meridian 1 non-Fibre Remote IPE system functions are operating correctly, you can proceed with fault isolation and fault correction of Fibre Remote IPE equipment.

Table 12 deals specifically with Fibre Remote IPE service problems. To diagnose these problems, the table refers you to the test procedures in this manual that will most likely be able to resolve them.

Table 12
Meridian 1 Fibre Remote IPE equipment problems (Part 1 of 2)

Symptoms	Diagnosis	Solution
Red LED on the Fibre Superloop Network card or Fibre Peripheral Controller card permanently on.	Card is disabled or faulty.	Go to <i>Procedures 1, 2, and 5</i> in this chapter to check the card status and perform self-test. Also enter the STAT command on the MMI terminal to check the card status.
LED on the Electro-optical packetlet is on.	Fibre-optic link is in red alarm state and there is no communication over the link.	Check fibre-optic link connections and go to <i>Procedure 3</i> to test the link using the loopback test.
Link is OK but no communication with the system monitor.	System monitor address incorrect.	Define a unique address correctly. Observe the XMI messages on the MMI terminal and check the description of these messages listed in <i>Appendix A</i> . Use this information to locate and correct the fault.
Display on the Fibre Peripheral Controller card shows fault codes.	Card faulty: failed self-test or problem communicating with peripheral equipment.	Go to <i>Procedures 4 and 6</i> to check tracking and loopback. Also refer to <i>X11 input/output guide (553-3001-400)</i> for a list of codes. Based on the maintenance display codes description, take the appropriate action and resolve the problem.

Table 12
Meridian 1 Fibre Remote IPE equipment problems (Part 2 of 2)

Symptoms	Diagnosis	Solution
Error messages printed on the MMI terminal or the Meridian 1 TTY.	Hardware or software problems with the Fibre Remote IPE.	Note various error messages. Refer to <i>Appendix A</i> in this manual and <i>X11 input/output guide</i> (553-3001-400) for a list of these messages and their description. Based on the code's description, take the appropriate action to resolve the problem.
Red alarm is displayed on the TTY.	Fibre network and/or peripheral equipment failure.	Query the status on the fibre-optic links by entering the QFIB command at the MMI terminal.

If you cannot resolve the problem after exhausting all available diagnostic tools and test procedures, make a list of the symptoms and contact your field service representative.

Fibre Superloop Network card fault isolation and correction

The NT1P61 Fibre Superloop Network card provides a communication interface between the CPU and the Fibre Peripheral Controller card.

The Fibre Superloop Network card processes signaling information and data received from the Fibre Peripheral Controller card over the fibre-optic link.

Problems with the Fibre Superloop Network card may be caused by hardware faults, incorrect configuration, a disabled Fibre Superloop Network card, or continuity problems between the card and other network cards connected to the network bus. To isolate and correct problems with the Fibre Superloop Network card, follow the procedures below.

Procedure 1

Checking the status of Fibre Superloop Network card

The diagnosis in Table 12 indicates that the Fibre Superloop Network card may be faulty or disabled. The first step in identifying the problem is to verify the status of the Fibre Superloop Network card. The status of a Fibre Superloop Network card is obtained by executing the **STAT loop** command in Network and Signaling Diagnostic Program LD 30.

To obtain the Fibre Superloop Network card status:

- 1** Log in on the maintenance terminal as described in “Using maintenance programs” on page 103 in this document.
- 2** At the > prompt, type **LD 30** and press the Enter key to access the Network and Signaling Diagnostic Program LD 30.
- 3** Type **STAT loop** and press the Enter key, where **loop** is the loop number of the Fibre Superloop Network card you are testing.
- 4** If the response is UNEQ = then the loop is not equipped (the Fibre Superloop Network card is not installed).

- 5 If the Fibre Superloop Network card is manually disabled using LD 30, the response can be:

DSBL: NOT RESPONDING = the loop is disabled and the card is not responding (the card is missing, disabled by the EBL/DIS switch, or faulty).

DSBL: RESPONDING = the loop is disabled and the card is responding (the card is disabled with DISL command, the Peripheral Signaling card is disabled, or an overload condition exists).

Note: Overload conditions are indicated by OVDxxx messages. Refer to *X11 input/output guide* (553-3001-400) for the message description and indication of the problem.

x BUSY, y DSBL = the loop is enabled with x channels busy and y channels disabled.

CTYF L1 L2... = loop specified in STAT command cannot receive speech from one or more loops or there is a possible continuity test failure due to a faulty network card such as the Fibre Superloop Network card.

Type **ENLL loop** and press the Enter key to enable the loop, where **loop** is the Fibre Superloop Network card loop number. A message indicating that the Fibre Superloop Network card is enabled and working is displayed on the console. Also observe the red LED on the Fibre Superloop Network card. If it turns off, the Fibre Superloop Network card is functioning correctly. If the LED continues to stay on, the Fibre Superloop Network card probably failed self-test and a message should be displayed on the maintenance terminal to that effect.

If the message indicates that the Fibre Superloop Network card is faulty, replace the card.

Procedure 2**Performing the Fibre Superloop Network card self-test**

If the NT1P61 Fibre Superloop Network card appears faulty, you should conduct the self-test to verify that it is actually faulty before you replace it. This test verifies the basic Fibre Superloop Network card functions and outputs a fail or pass message after the test is completed.

To perform the self-test, follow the steps below:

- 1** Log in on the maintenance terminal as described in “Using maintenance programs” on page 103 in this document.
- 2** At the > prompt, type **LD 32** and press the Enter key to access the Network and PE Diagnostic Program.
- 3** Type **DISL loop** and press the Enter key to disable the Fibre Superloop Network card, where **loop** is the Fibre Superloop Network card loop number you are disabling.
- 4** Type **XNTT loop** and press the Enter key to start the self-test, where **loop** is the Fibre Superloop Network loop number specified for self-test.

If the response is:

TEST PASSED

The Fibre Superloop Network card passed the self-test and is functional; it must be enabled to turn off the red LED and to start processing calls.

If the Fibre Superloop Network card passed the self-test, but the problem persists, the loop or other cards that interface with the Fibre Superloop Network card may be faulty. To verify the integrity of the network bus and connections between the Fibre Superloop Network card and other network and peripheral equipment cards interfacing with the Fibre Superloop Network card, go to Procedure 3.

If the response is

TEST FAILED REASON: xxxx

XPE0 {NOT} CONNECTED

XPE1 NOT CONNECTED

The Fibre Superloop Network card failed the self-test and is faulty, where **xxxx** can be one of the following values:

- 0—ROM checksum failed
- 1—FLASH checksum failed
- 2—A21 #1 faulty
- 3—A21 #2 faulty
- 4—R71 faulty

Replace the Fibre Superloop Network card as described in Replacement procedures. NPRxxx message may be displayed as a result of a command activated self-test if the Fibre Superloop Network card is missing, not configured, and so on.

- 5 Exit LD 32 by typing **** at the prompt.

Procedure 3

Performing the Fibre Superloop Network loopback tests

If the NT1P61 Fibre Superloop Network card self-test indicates that the card is not faulty, you should conduct loopback tests to isolate the problem that may exist on network cards, network buses, or fibre-optic link connections between the Fibre Superloop Network card and the Fibre Peripheral Controller card.

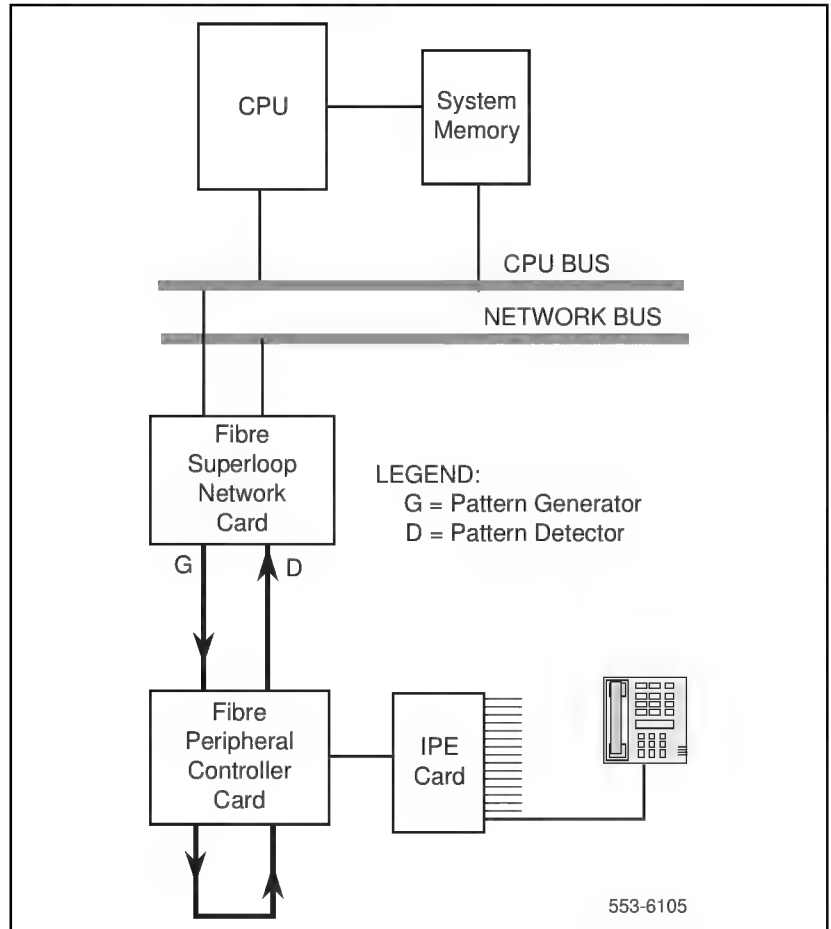
Loopback tests check the continuity between various interface points in the system. This is performed by sending a known signal pattern from the originating point to the destination and receiving it back at the originating point or a designated detecting point. If the pattern is detected and it matches the transmitted pattern without errors, the test verifies that the tested equipment and their connections are operating correctly. However, if the pattern is not detected or it is detected with errors, the equipment or the connections between the equipment are faulty.

The loopback uses the Fibre Superloop Network card as a pattern generator and detector. The signal is transmitted by the Fibre Superloop Network card to the Fibre Peripheral Controller card and looped back to the Fibre Superloop Network card over the fibre-optic link.

Note: For a Fibre Remote IPE with the redundant fibre-optic link, the loopback is automatically routed over the functioning link, not the faulty link. To identify the Electro-optical packlet that may be faulty, you can perform the packlet test at each end of the link by following the instructions in step 6 of this Procedure.

Figure 21 illustrates the loopback path and shows the Fibre Superloop Network card as a test pattern generator and detector.

Figure 21
Loopback path for XCON test 6



To start the loopback test:

- 1 Log in on the maintenance terminal as described in “Using maintenance programs” on page 103 in this document.
- 2 At the > prompt, type **LD 45** and press the Enter key to access the Background Signaling and Switching Program.
- 3 Select test condition:
 - Enter XCON 0 and press the Enter key if you wish to perform only one loopback test.
 - Enter one test period shown in XCON H 1-255, M 1-255, S 1-255 and press the Enter key to select continuous loopback testing for a selected time link, where H 1-255 is 1 to 255 hours, M 1-255 is 1 to 255 minutes, and S 1-255 is 1 to 255 seconds.

Example: XCON M 5 specifies the duration of the test to be 5 minutes.

- 4 At the TEST prompt, type **6** and press the Enter key. Continue responding to the prompts to configure the loopback test as follows:

Command	Range	Description
TEST	6	XCON test number
PATT	0–7	Signal pattern
TYPG	N	Fibre Superloop Network card—generator
SUPL	0–156	Superloop in multiple of 4
SLOT	xx	Timeslots 2–31, 34–63, 66–95, 98–127
TYPD	N	Fibre Superloop Network card—detector
SUPL	0–156	Superloop in multiple of 4
LBTY	P	Loopback through Fibre Controller
LBTN	11 s 99	Special Fibre Controller loopback channel
TAG x	0–15	Tag number assigned by the system

- 5** Check the loopback test results. The results are automatically displayed if you specified XCON 0 test conditions; otherwise, you must specify XSTA or XSTP with the test TAG number to check the status. XSTA gets the status of the manual continuity test and XSTP stops the manual continuity test. If the results show BSDxxx messages, refer to the list and description of these messages in *X11 input/output guide* (553-3001-400). The BSDxxx messages indicate the possible causes of the problem, which you should check to isolate the actual problem.
- If the loopback continuity test passes, the problem may be somewhere in the IPE cards.
 - If the loopback continuity fails, go to Procedure 3.
- 6** Perform the Electro-optical packet test by using the MMI terminal or TTY at each end of the link:
- From the MMI terminal execute the **TEST P/S**, where **P** = primary packet and **S** = secondary packet
 - Connect the transmit port to the receive port with a short fibre-optic patchcord on the Electro-optical packet being tested.
 - The packet is operating correctly if the red LED turns off and stays off during the test with the patchcord installed. Otherwise, the packet is faulty and should be replaced.
 - Repeat step 6 for the other end of the link.

Fibre Peripheral Controller card fault isolation and correction

The NT1P62 Fibre Peripheral Controller card provides a communication interface between the Fibre Superloop Network card and the IPE cards housed in the Fibre Remote IPE module or cabinet.

Problems with the Fibre Peripheral Controller card may be caused by hardware faults, incorrect configuration, a disabled Fibre Peripheral Controller card, or continuity problems between the card and IPE cards connected to the peripheral bus. To isolate and correct problems related to the Fibre Peripheral Controller card, follow the procedures below.

Procedure 4

Checking the Fibre Peripheral Controller card tracking status

The Fibre Peripheral Controller card can display tracking information, which shows the status of the Fibre Peripheral Controller card phase-lock loop and to what clock source it is locked. To obtain this information, execute the **RPED I s** command in Network and Signaling Diagnostic Program LD 30.

To obtain the Fibre Peripheral Controller card tracking status:

- 1 Log in on the maintenance terminal as described in "Using maintenance programs" on page 103 in this document.
- 2 At the > prompt, type **LD 30** and press the Enter key to access the Network and Signaling Diagnostic Program LD 30.
- 3 Type **RPED I s** and press the Enter key, where **I** is the loop number of the Fibre Superloop Network card and **s** is the shelf or module you are testing.

The Fibre Peripheral Controller card may return one of the following codes:

C0—clock is locked on the primary Electro-optical packet

C1—clock is locked on the secondary Electro-optical packet

- 4 Exit LD 30 by typing ******** at the prompt.
- 5 Check the incoming signal. If present, replace the packet; otherwise, find the problem on the link.

Procedure 5**Performing the Fibre Peripheral Controller card self-test**

If the Fibre Peripheral Controller card appears faulty, you should conduct the self-test to verify that it is actually faulty before you replace it. This test verifies the basic Fibre Peripheral Controller card functions and outputs a fail or pass message after the test is completed. During self-test the Fibre Peripheral Controller card displays HEX messages indicating the test performed. To identify the codes displayed, refer to Table 14.

To perform the self-test, follow the steps below:

- 1** Log in on the maintenance terminal as described in “Using maintenance programs” on page 103 in this document.
- 2** At the > prompt, type **LD 32** and press the Enter key to access the Network and PE Diagnostic Program.
- 3** Type **DSXP x** and press the Enter key to disable the Fibre Peripheral Controller card, where **x** is the Fibre Peripheral Controller card you are disabling.
- 4** Type **XPCT x** and press the Enter key to start the self-test, where **x** is the Fibre Peripheral Controller card specified for self-test.

If the response is:

TEST PASSED

The Fibre Peripheral Controller card passed the self-test and is functional. It must be enabled to turn off the red LED and start processing calls.

Type **ENXP x** and press the Enter key to enable the card.

If the Fibre Peripheral Controller card passed the self-test, but the problem persists, the link or other cards that interface with the Fibre Peripheral Controller card may be faulty. To verify the integrity of the peripheral bus and the Fibre Peripheral Controller card, go to Procedure 6.

If the response is:

TEST FAILED REASON: xxxx

The Fibre Peripheral Controller card failed the self-test and is faulty, where **xxxx** specifies the cause of the fault. An **NPRxxx** message may be displayed as a result of a command activated self-test if the Fibre Peripheral Controller card is missing, not configured, and so on.

- 5** Exit LD 32 by typing ******** at the prompt.

Procedure 6

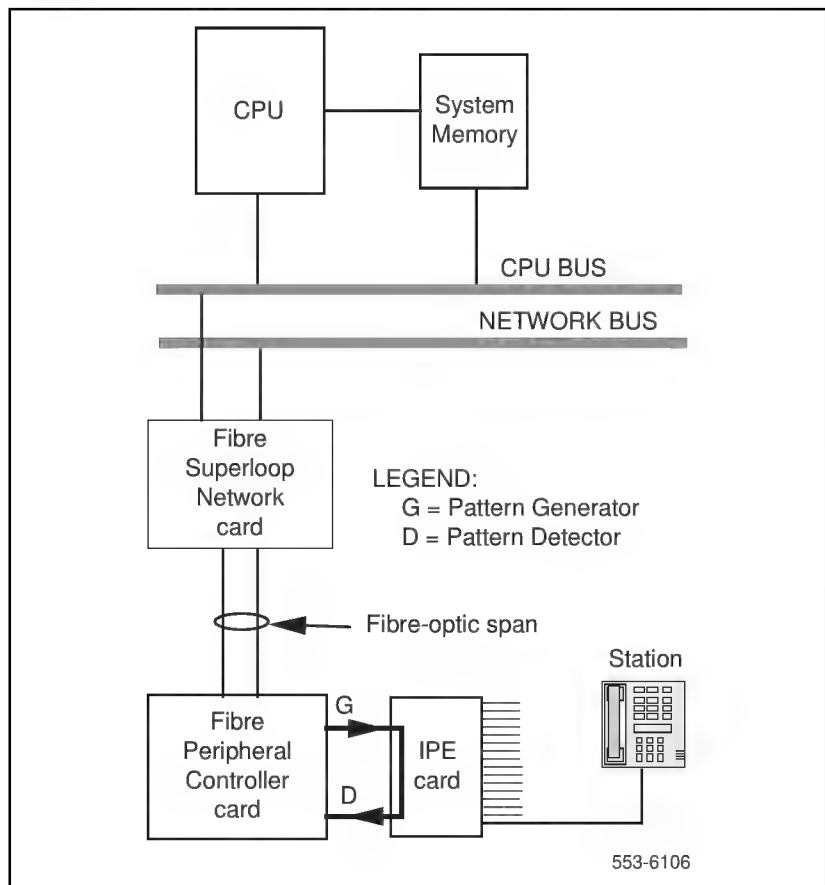
Performing the Fibre Peripheral Controller card loopback test

The loopback uses the Fibre Peripheral Controller card as a pattern generator and detector. The signal is transmitted by the Fibre Peripheral Controller card back to the Fibre Peripheral Controller card over a special loopback channel on the peripheral bus.

Figure 22 illustrates the loopback path and shows the Fibre Peripheral Controller card as a test pattern generator and detector.

Figure 22

Loopback path for XCON test 7



To perform the loopback test:

- 1 Log in on the maintenance terminal as described in “Using maintenance programs” on page 103 in this document.
- 2 At the > prompt, type **LD 45** and press the Enter key to access the Background Signaling and Switching Program.
- 3 Select test condition:
 - Enter XCON 0 and press the Enter key if you wish to perform only one loopback test.
 - Enter one test period shown in XCON H 1-255, M 1-255, S 1-255 and press the Enter key to select continuous loopback testing for a selected time link, where H 1-255 is 1 to 255 hours, M1-255 is 1 to 255 minutes, and S 1-255 is 1 to 255 seconds.

Example: XCON M 5 specifies the duration of the test to be 5 minutes.

- 4 At the TEST prompt, type **7** and press the Enter key. Continue responding to the prompts to configure the loopback test as follows:

Command	Range	Description
TEST	7	XCON test number
PATT	0–7	Signal pattern
TYPG	P	Fibre Peripheral Controller card—generator
TN	1 s 99 0	Special Fibre Peripheral Controller loopback channel
TAG x	0–15	Tag number assigned by the system

- 5 Check the loopback test results. The results are automatically displayed if you specified XCON 0 test conditions; otherwise, you must specify XSTA or XSTP with the test TAG number to check the status. XSTA gets the status of the manual continuity test and XSTP stops the manual continuity test. If the results show BSDxxx messages, refer to the list and description of these messages in *X11 input/output guide* (553-3001-400). The BSDxxx messages indicate the possible causes of the problem, which you should check to isolate the actual problem.
 - If the loopback continuity test passes, the problem may be somewhere in the IPE cards.
 - If the loopback continuity fails, replace the card.

Fault isolation and correction using MMI maintenance commands

You can perform some testing and troubleshooting of the Fibre Remote IPE from a local or a remote MMI terminal or TTY by typing MMI commands on the terminal without loading system diagnostic programs (overlays).

These commands provide current equipment status, invoke card testing, check equipment performance, print messages from log files, and so on.

Procedure 7 Checking Fibre Remote IPE using MMI commands

This procedure uses MMI commands to maintain Fibre Remote IPE cards, and fibre-optic link status.

You can send these commands from the local MMI terminal to be executed by the remote site MMI terminal and vice versa by executing the **SUBM string** command, where string is the actual command sent to the other side.

For example, **SUBM PLOG 10** entered at the local MMI terminal will request that the remote site prints 10 messages from the log file located in the Fibre Peripheral Controller card memory.

To obtain the Fibre Superloop Network and Fibre Peripheral Controller cards status:

- 1

Log in on the MMI maintenance terminal.
- 2

Type **STAT** to check the status or the card connected to the MMI terminal.

The response:

Enabled/Disabled	PLL: lock/unlock prim/sec
------------------	---------------------------

The card is enabled by the CPU, when enabled. The phase-lock loop can be locked to the incoming signal or not, and the PLL may be locked on the primary or secondary packet.

- 3 Type **TEST P/S** and press the Enter key, where **P** tests the primary packet and **S** tests the secondary packet.

The response is one of the self-test messages listed in Appendix A.

- 4 Type **QFIB** and press the Enter key to query the status of the fibre-optic link.

The response:

PRIM physical/signal/direction

SEC physical/signal/direction

physical represents the status of the Electro-optical packet, which can be **equipped**, **unequipped**, or **faulty**.

signal represents the status of the incoming signal, which can be **SF** (signal failed), **SD** (signal degrade not implemented in Rev 1 H/W), or **NA** (no alarm).

direction represents the direction of traffic on the link, which can be **incoming**, **outgoing**, **bothways**, or **none**.

- 5 Type **QALM** and press the Enter key to query the alarm status of the fibre-optic link.

The response:

PRIM alarm type

SEC alarm type

alarm on the Electro-optical packet can be **red** (local alarm), **yellow** (remote alarm), or **clear** (no alarm).

type indicate one of the following types of alarm when it exists: **LOS**, **LOF**, **LOP**, or **FERF**.

- 6 Type PRPM {prim/sec} and press the Enter key to print the Performance Monitoring report for the primary and secondary fibre-optic links.

The format of the response is shown in Table 13.

Table 13 shows the format for the Performance Monitoring report. The report shows a matrix of fibre-optic link performance parameter values for different interval counters listed in the header and intervals listed in the first column.

Table 13
Performance Monitoring report form

link: prim/sec		date: mm/dd/yy				time: hh/mm		
Interval	Section					Line		
	SEFS	CV	ES	SES	CV	ES	SES	PSC
C	n	n	n	n	n	n	n	n
1	n	n	n	n	n	n	n	n
2	n	n	n	n	n	n	n	n
3	n	n	n	n	n	n	n	n
4	n	n	n	n	n	n	n	n
CD	n	n	n	n	n	n	n	n
PD	n	n	n	n	n	n	n	n

Section parameter description:

SEFS (Severely Errored Framing Seconds) indicates the number of seconds when at least one out-of-frame (OOF) or one change of frame alignment (COFA) occurred.

CV (Section Coding Violations) counts section BIP-8 violations in the STS-3 frame.

ES (Section Errored Seconds) indicates a second during which at least a coding violation (CV), an out-of-frame (OOF), or a change of frame alignment (COFA) occurred.

SES (Section Severely Errored Seconds) counts the number of seconds when at least 16 coding violations (CV), an out-of-frame (OOF), a change of frame alignment (COFA), or loss-of-signal (LOS) occurred

Line parameter description:

CV (Line Coding Violations) counts all line BIP-8 violations over all STS-3 frames.

ES (Section Errored Seconds) indicates a second during which at least a coding violation (CV) or a line alarm indication signal (AIS) state was detected.

SES (Section Severely Errored Seconds) counts the number of seconds with at least 32 line coding violations (CV) when the line alarm indication signal (AIS) state was detected.

PSC (Protection Switching Counts) counts the number of times when link protection switching occurred due to signal fail (SF) or signal degrade (SD) condition.

Interval parameter description:

C (Current interval) is the status of section and line parameters at the time interval when the Performance Monitoring report is issued.

1 through **4** are subsequent four intervals

CD is current day or the day the report was issued

PD is previous day or the day before the report was issued.

Replacing Fibre Remote IPE cards

If after completing troubleshooting you determine that one or more Fibre Remote IPE cards are defective, you will have to remove them and replace them with spares. When you insert a spare Fibre Superloop Network card or Fibre Peripheral Controller card in the module or wall-mounted cabinet, observe the card LED (the uppermost LED on the faceplate) to determine if the card passed self-test. Package and ship the defective cards to an authorized repair center.

Unpacking replacement cards

Unpack and visually inspect replacement cards as follows:

- 1** Inspect the shipping container for damage. Notify your distributor if you find that the container is damaged.
- 2** Remove the unit carefully from the container. Do not puncture or tear the container—use a utility knife to open it. Save the container and the packing material for shipping the defective card.
- 3** Visually inspect the replacement card for obvious faults or damage. Report the damage to your sales representative.
- 4** Keep cards in their antistatic bags until you are ready to install them. Do not stack them on top of each other.
- 5** Install cards. When handling the cards, hold them by their nonconducting edges to prevent damage caused by static discharge.

Removing and replacing a card

A Fibre Remote IPE card can be removed from and inserted into a Meridian 1 module or the Remote IPE module or wall-mounted cabinet without turning off the power to the module or cabinet. This feature allows Meridian 1 to continue normal operation when you are replacing a Fibre Superloop Network card in Meridian 1 or a Fibre Peripheral Controller card in the Remote IPE module or cabinet.

Removing and replacing a Fibre Superloop Network card

- 1 Disable the Fibre Superloop Network card by logging in to the system terminal, loading the Network and Peripheral Equipment Diagnostic Program LD 32, and executing **DIS loop**, where **loop** is the actual loop number of the Fibre Superloop Network card.
- 2 Set the ENL/DIS switch to DIS.
- 3 Disconnect all the fibre-optic patchcords and the SDI/System Monitor cable from the card faceplate.
- 4 Unlatch the card's locking devices by squeezing the tabs and pulling the upper locking device away from the card and pressing the lower locking device downward.
- 5 Pull the card out of the network module and place it into an antistatic bag away from the work area.
- 6 Check the replacement card and make sure that the Electro-optical packlets are already installed. If not installed, install the new packlets or remove the packlets from the faulty Fibre Superloop Network card and install them on the replacement card if you are sure that the packlets are not faulty.
- 7 Set the replacement card ENL/DIS switch to DIS.
- 8 Hold the replacement card by the card locking devices and insert it partially into the card guides in the module.
- 9 Pull the upper locking device away from the faceplate on the card and press the lower locking device downward and insert the card firmly into the backplane connector. Press the upper locking device firmly against the faceplate and press the lower locking device upwards to latch the card inside the module.
- 10 Set the ENL/DIS switch on the Fibre Superloop Network card to ENL. The Fibre Superloop Network card automatically starts the self-test.

- 11 Observe the red LED on the front panel during self-test. If it flashes three times and stays on, it has passed the test; go on to step 12. If it does not flash three times and then stays on, it has failed the test. Pull the card partially out of the module and reinsert it firmly into the module. If the problem persists, troubleshoot or replace the Fibre Superloop Network card.
- 12 Connect the SDI/System Monitor cable and the fibre-optic patchcords to the faceplate connectors of Fibre Superloop Network card.
- 13 Set the ENL/DIS switch to ENL. If the upper most red LED on the Fibre Superloop Network card faceplate turns off, the card is functioning correctly and is enabled. The outcome of self-test will also be indicated on the system terminal or TTY (or the MMI terminal connected to the SDI/System Monitor connector on the faceplate of the Fibre Superloop Network card). If the LED stays on, go to “Isolating and correcting faults” on page 107 in this document.
- 14 Tag the defective card(s) with a description of the problem and prepare them for shipment to your equipment supplier’s repair depot.

Removing and replacing a Fibre Peripheral Controller card

- 1 Log in on the maintenance terminal as described in “Using maintenance programs” on page 103 in this document.
- 2 At the > prompt, type LD 32 and press the Enter key to access the program.
- 3 Type **DSXP x**, where **x** is the Fibre Peripheral Controller card, and press the Enter key to disable the card. The Fibre Peripheral Controller card is now disabled and you can remove it.
- 4 Disconnect all the fibre-optic patchcords from the card faceplate.
- 5 Unlatch the card’s locking devices by squeezing the tabs and pulling the upper locking device away from the card and the lower locking device downwards.
- 6 Pull the card out of the IPE module or cabinet and place it in an antistatic bag away from the work area.

- 7 Check the replacement card and make sure that the Electro-optical packlets are already installed. If not installed, install the new packlets or remove the packlets from the faulty Fibre Peripheral Controller card and install them on the replacement card if you are sure the packlets are not faulty.
- 8 Hold the replacement card by the card locking devices and insert it partially into the card guides in the module.
- 9 Pull the upper locking device away from the faceplate on the card and the lower locking device downwards and insert the card firmly into the backplane connector. Press the upper locking device firmly against the faceplate and the lower locking device upwards to latch the card inside the module. The Fibre Peripheral Controller card automatically starts the self-test.
- 10 Observe the red LED on the front panel during self-test. If it flashes three times and stays on, it has passed the test. Go to step 11. If it does not flash three times and then stays on, it has failed the test. Pull the card partially out of the module and reinsert it firmly into the module. If the problem persists, troubleshoot or replace the Fibre Peripheral Controller card.
- 11 Connect the fibre-optic patchcords to the optical connectors of the Fibre Peripheral Controller card faceplate. For a wall-mounted Fibre Remote IPE, plug the fibre-optic link FC/PC optical connectors into the FC/PC optical connectors on the Fibre Peripheral Controller card faceplate.
- 12 At the: prompt in the LD 32 program, type **ENXP x**, where **x** is the Fibre Peripheral Controller card, and press the Enter key to enable the card. If the uppermost red LED on the Fibre Peripheral Controller card faceplate turns off, the card is functioning correctly and is enabled. The outcome of self-test will also be indicated by LD 32 on the MMI terminal connected to the Fibre Peripheral Controller card. If the LED stays on, go to “Isolating and correcting faults” on page 107 or replace the card.
- 13 Tag the defective card(s) with a description of the problem and prepare them for shipment to your equipment supplier’s repair depot.

Reinstalling covers

When you determine that the Fibre Remote IPE is operating correctly, do the following:

- 1** Reinstall the covers on Meridian 1 module.
- 2** Reinstall the cover on the Remote IPE floor-standing module or the wall-mounted cabinet.
- 3** Terminate you session with Meridian 1 by logging out on your maintenance terminal: type LOGO at the: prompt and press the Enter key. If using the MMI terminal, log out to complete the test and troubleshooting session.

Packing and shipping defective cards

To ship a defective card to a Northern Telecom repair center, you should:

- 1** Tag the defective card with the description of the problem.
- 2** Package the defective card for shipment using the packing material from the replacement card. Place the card in an antistatic bag, put in the box, and securely close the box with tape.
- 3** Obtain shipping and cost information from Northern Telecom and mail the package to an authorized repair center.